SUGGESTED PRICE 50 CENTS

RCA

operating and
maintenance instructions

MINI CHRO-BAR GENERATOR
Type WR-508A

RCA | Electronic Components | Harrison, N.J. 07029

Safety Precautions

Always become familiar with the equipment under test before working on it, bearing in mind that high voltages may appear at unexpected points in defective equipment. Additional precautions which experience in the industry has shown to be important are listed below:

1. Always use an isolation transformer, such as the WP-25A Isotap, when working with AC/DC equipment having the chassis connected directly to one side of the AC power line. (Use the Isotap sockets marked "ISOLATED" for this purpose.)
2. It is good practice to remove power before connecting test leads to high-voltage points. If this is impractical, be especially careful to avoid accidental contact with equipment racks and other objects which can provide a ground. Working with one hand in your pocket and standing on a properly insulated floor lessens the danger of shock.
3. Filter capacitors may store a charge large enough to be lethal. Therefore, discharge filter capacitors before attaching test leads.
4. Remember that leads with broken insulation provide the additional hazard of high voltages appearing at exposed points along the leads. Check test leads for frayed or broken insulation before working with them.
5. To lessen the danger of accidental shock, disconnect test leads immediately after test is completed.
6. Remember that the risk of severe shock is only one of the possible hazards. Even a minor shock can place the operator in jeopardy of more serious risks, such as a bad fall or contact with a source of higher voltage.
7. The experienced operator continuously guards against injury and does not work on hazardous circuits unless another person is available to assist in case of accident.

Available Separately

AC Adapter, WG-425A
(Permits operation from
120 V, 60 Hz power line)

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Description

The RCA WR-508A MINI CHRO-BAR Generator is a compact, solid-state instrument that provides the test signals required for adjusting convergence, color-phasing, purity, and linearity of color television receivers. Patterns generated by the WR-508A include color bars, crosshatch, dots, and blank raster. RF output is provided on channel 3. The output cable connects directly to the antenna terminals of the TV receiver.

The small size and light weight of the MINI CHRO-BAR Generator make the unit ideal for portable use. The instrument is battery operated, using a single 4.5 volt long-life alkaline battery. A slide-out compartment is located on the rear panel for convenient battery replacement. An accessory AC adapter, the WG-425A, is available separately for operating the generator from a standard 120 volt, 60 Hz power line outlet.

New crystal-controlled solid-state circuitry, using integrated-circuit devices is used in the WR-508A. This circuit is especially designed to provide stable patterns with no flicker. Three pattern adjustment controls are provided on the rear panel. If the circuit should require readjustment, these controls can be reset quickly and easily using only a properly operating TV receiver.

Ten color bars are provided simultaneously in the color bar pattern, including R-Y, B-Y, G-Y, I and Q signals, spaced at 30 degree phase intervals. This pattern is for use in checking color phase and matrixing circuits, and adjusting the automatic frequency phase control (AFPC). Narrow brightness pulses are added at the edges of each color bar to aid in checking the color "fit" or registration of the brightness and color signals.

The dot pattern is used primarily in convergence adjustment. The pre-shoot and over-shoot areas (small black edging preceding and following each dot) can be used to estimate the overall quality of the receiver alignment. The crosshatch pattern is for use in adjusting linearity in both black and white and color receivers, and as an alternate pattern for adjusting convergence. Consisting of a fixed number of vertical and horizontal lines, this pattern can also be used to check receiver overscan adjustment. The blank raster function is useful for both purity and color temperature adjustment.

Specifications

Output (All signals crystal-controlled)	
RF Carrier	picture carrier 61.25 MHz (ch 3)*
Horizontal Sync	15804 Hz
Color Subcarrier	3,563.741 kHz, ±20 cycles, keyed at 189 kHz
Output Impedance	approximately 300 ohms
Output Voltage	10,000 microvolts (approx.)
Test Patterns	color bars (variable chroma level) dots crosshatch blank raster
Battery	unit powered by one 4.5 volt alkaline battery, RCA VS1149 or equiv.
Dimensions	
Width	6½ in.
Height	3 in.
Depth	4 in.
Weight	19.5 oz.

* The WR-508A can be operated on channel 4 by replacing the crystal as described on page 14.

WG-425A AC Adapter

The WG-425A AC Adapter, available separately, permits the WR-508A to be operated from a 120 volt, 60 Hz power line. To operate the generator with the Adapter, simply insert the Adapter plug into the jack on the battery compartment bracket. It is recommended that the battery be left in the generator when the AC Adapter is used, since it acts as a filter to minimize 60 Hz interference.

Battery Test

The WR-508A is powered by a single 4.5 volt alkaline battery. (RCA VS1149 or equiv.) Normally, the unit will operate properly unless the battery voltage goes below approximately 3 volts. The battery is located in a convenient slide-out compartment, making testing and replacement easy. To test the battery, slide out the battery compartment as described below. Turn on the generator, then measure the battery voltage using a VTVM or VOM. Replace battery if voltage is less than 3.5 volts.

The battery can also be removed from the instrument and tested with a battery tester. When replacing the battery, be sure to insert new battery with the polarity as marked on the battery holder.

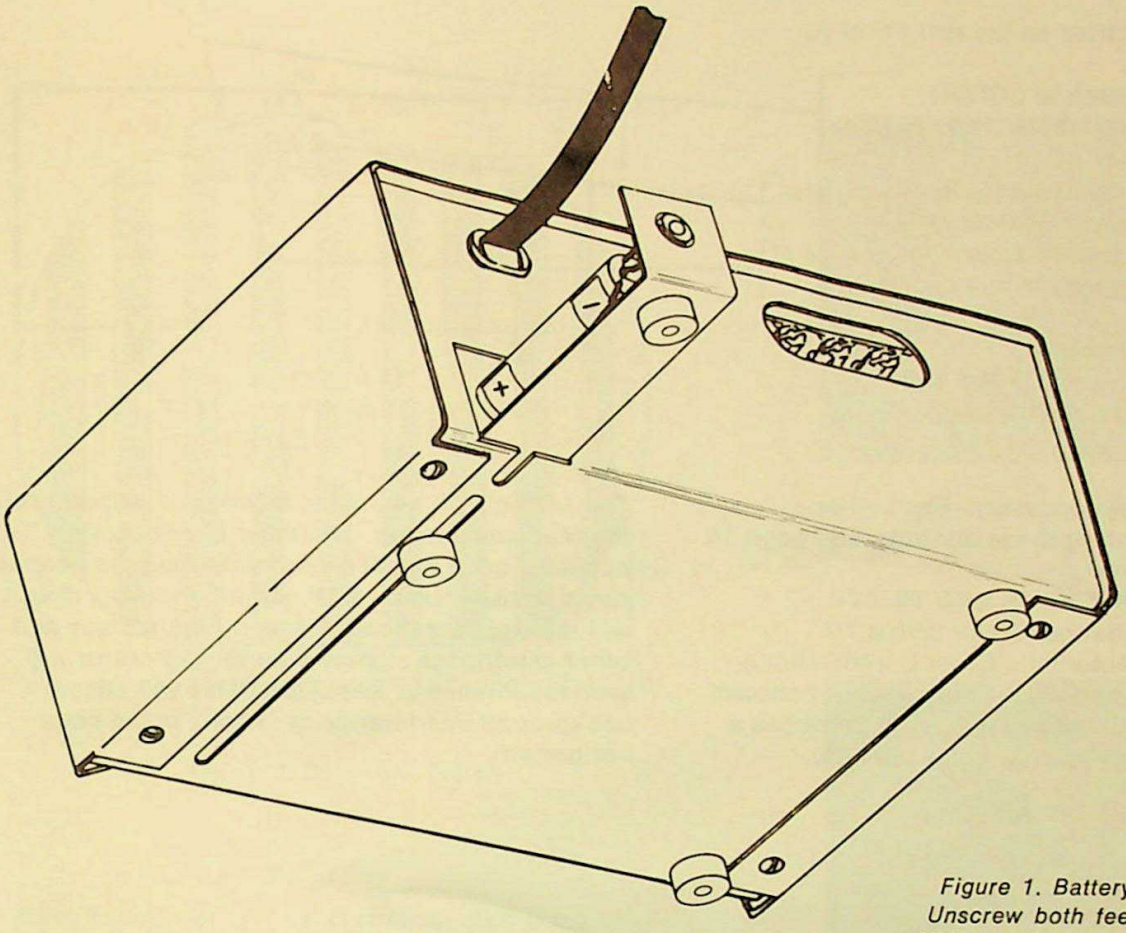


Figure 1. Battery Installation
Unscrew both feet at left side.
Slide battery compartment back.

Operation

General

The following procedure describes the connection of the WR-508A to a TV receiver and the method of obtaining the desired pattern on the receiver screen. Before operating the generator, check the operation of the TV receiver by observing the reception of a televised station signal. Adjust the receiver horizontal and vertical hold controls so that the picture is locked in properly, then set these controls to the center of their holding range.

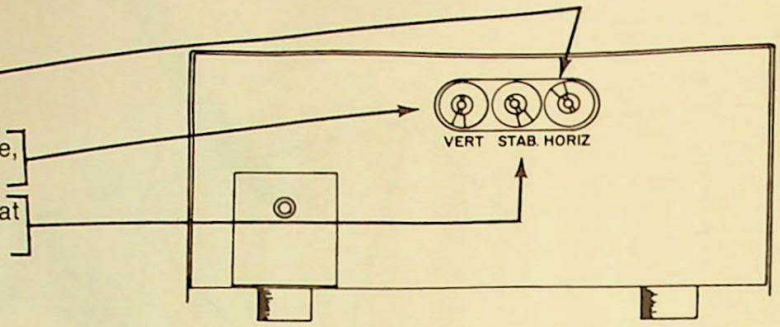
1. Disconnect the antenna line from the receiver. Attach the two output leads from the generator output cable to the antenna terminals.
2. Turn the receiver on and tune to channel 3. Turn receiver "color" or "saturation" control to mid-range.
3. Set the generator function switch to "CROSSHATCH". Adjust the receiver brightness and contrast as necessary. Adjust receiver fine tuning so that the vertical and horizontal bars have approximately the same brilliance.
4. Set the function switch to "DOTS", then the "BLANK RASTER" to observe these patterns.
5. Set the function switch to "COLOR BARS", and set the CHROMA LEVEL control to mid-range.
6. Readjust the receiver fine-tuning, if necessary, for best color bar pattern, i.e., highest color saturation with least background interference. If the receiver is operating normally with proper horizontal centering and width adjustment, ten color bars will be seen.

Pattern Stability

The WR-508A is especially designed to provide stable patterns with no flicker. If the pattern should go out of sync, first check the TV receiver fine-tuning, and vertical and horizontal hold controls. Then, check the generator battery as described on page 4. If a stable pattern cannot be obtained,

adjust the three controls on the real panel as shown below:

1. Set generator switch to COLOR BAR position. Adjust "HORIZ" control for straight bars.
2. Set "VERT" control fully counterclockwise, then adjust to lock in vertical sync.
3. Adjust "STAB" control around mid-range at a point providing minimum flicker and weaving.
4. Set generator switch to CROSSHATCH. Adjust STAB and VERT controls to obtain a stable pattern.



Repeat procedure as necessary. For further information on adjusting these controls, see page 14.

BACKGROUND INTERFERENCE DUE TO ACC

When using a color bar generator with a TV receiver having an Automatic Color Control (ACC) circuit, the CHROMA LEVEL of the generator should be adjusted to the minimum setting that produces a color bar pattern with suitable color intensity.

The ACC circuit maintains a constant output level of the chroma amplifier. If a color bar generator applies a color signal level higher than the normal range transmitted by a TV station, the ACC circuit will maintain the chroma level but harmonics and other extraneous signals from the generator will tend to increase in amplitude. This will cause background interference or "hash" in the color bar pattern.

Applications

Checking Color Phase (hue)

Adjust the "hue" or "tint" control of the receiver until the eighth bar is cyan. Incorrect adjustment to one side will cause the eighth bar to be predominantly blue, while incorrect adjustment to the other side will cause the bar to be predominantly green. See Figure 2. If correct adjustment cannot be made, see section on AFPC alignment.

Checking Color Fit

The ten bars of color in the pattern should "fit" in the positions shown in Figure 2. The colors should not lap over into the blank spaces between the bars. Narrow brightness pulses are added to the leading and trailing edges of each bar, making it easier to observe color registration.

Improper fit may be caused by incorrect delay in the video amplifier, or by incorrect alignment of the bandpass amplifier.

Checking Color Sync Lock Action

The CHROMA LEVEL control may be used to check the color sync lock ability of the receiver.

To check color sync lock action, turn the CHROMA LEVEL control slowly counterclockwise. The color should become pale, and finally disappear. Since some receivers are equipped with an automatic chroma control circuit, the rate of fading will depend upon the model under test. Most receivers will hold color lock through the entire range, however some sets may lose color sync just before the color disappears, evidenced by diagonal running of the colors. Both of these conditions indicate normal operation of the color sync circuits. If however, a slight reduction of the chroma amplitude causes the color to fall out of lock, it indicates that the color synchronization ability of the receiver may be inadequate.

When the CHROMA LEVEL control is turned beyond the mid-range position, the relative amplitude of the

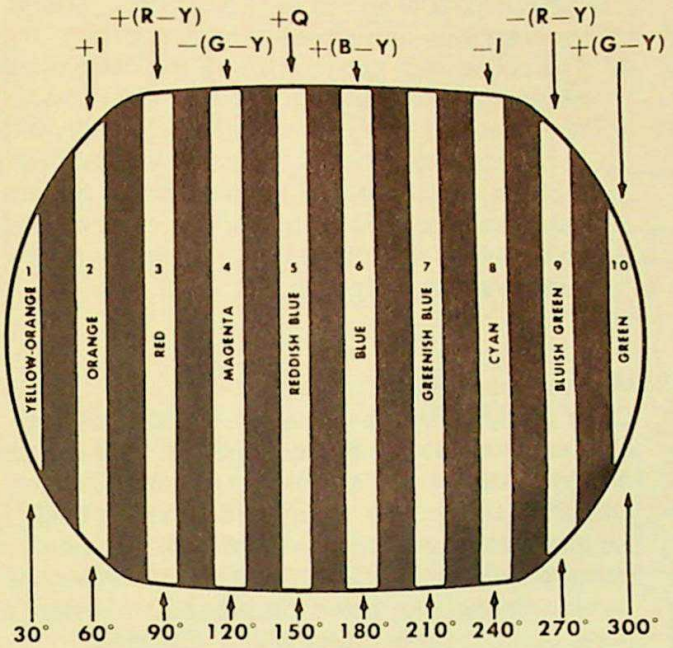


Figure 2. Color Bar Pattern

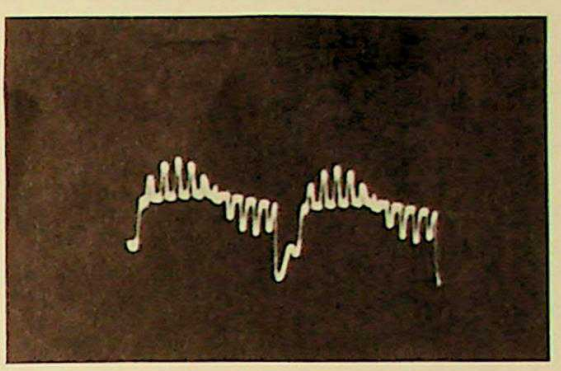


Figure 3. Typical "S" curve obtained with color bar at red gun grid. Correct adjustment with third bar (red) at maximum.

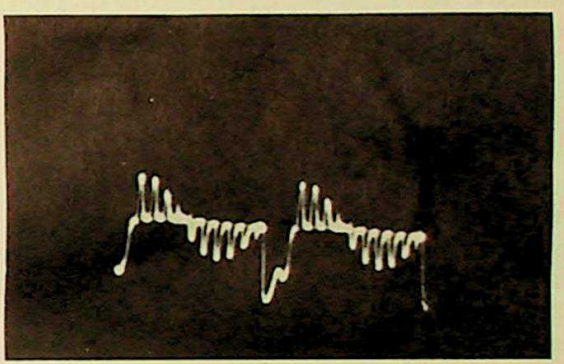


Figure 4. "S" curve obtained at red gun grid. Misadjusted so that first bar is at maximum. Picture would be too green.

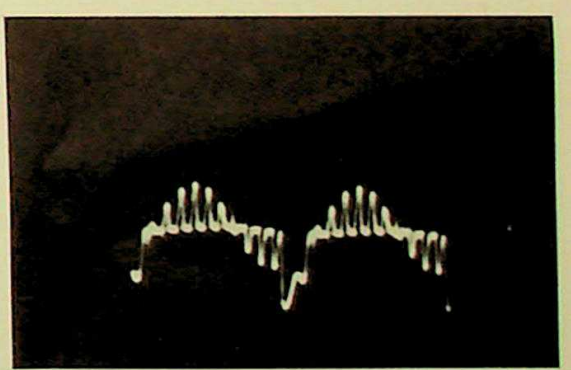


Figure 5. "S" curve obtained at red gun grid. Misadjusted so that fourth bar is at maximum. Picture would be too blue.

color subcarrier sync is increased. At the full clockwise position, the amplitude is approximately doubled. This additional range is helpful in diagnosing receiver trouble in cases where the response of the RF/IF bandpass amplifiers may be subnormal, or in cases when the sync lock action is not normal.

AFPC Alignment

When the AFPC circuit in a color TV receiver is adjusted properly, the tint control will have sufficient range to handle all variations of hue in the transmitted picture; the hue control will change only the hue and not the intensity; color sync will not be lost on weak signals; and color balance of the picture will not change with varying luminance. Operation of the chroma circuits can also be checked by viewing the color bar waveforms at the picture tube control grids. Figures 3, 4, and 5 show typical waveforms obtained at the red gun control grid.

The AFPC (automatic frequency and phase control) alignment procedure recommended by most color TV manufacturers uses a color-bar generator as a signal source and a VTVM for reference in adjusting the 3.58 MHz oscillator and the phase detector transformer. An oscilloscope is often

used to check the alignment of the phase detector transformer. The usual procedure for adjusting the reactance coil is to ground the reactance tube input, then set the coil for zero-beat of the color signal as observed on the receiver screen.
AFPC circuits can also be aligned using a vector pattern. A general-purpose oscilloscope such as the RCA WO-33A, WO-91C, or WO-505A can be used as a vectorscope for vector alignment by using the accessory RCA WG-409A Vectorprobe.
As with other alignment procedures in a color receiver, it is important that the technique recommended in the service notes for the particular receiver be followed.

Overscan Adjustment

The crosshatch pattern (H + V) generated by the WR-508A consists of a fixed number of vertical and horizontal bars. Accordingly, the crosshatch function provides a convenient method for adjusting the receiver overscan to insure that the proper portion of the raster is extended beyond the edge of the receiver mask.
Service notes for color receivers usually specify a recommended amount of overscan at the left and right, and a different amount of overscan at the top and bottom. The recommended overscan varies in different receiver models. Because the WR-508A provides a *fixed* number of vertical and horizontal bars, it is easy to judge the amount of overscan. The appearance of the crosshatch pattern with correct overscan in a representative model color receiver is shown in Figure 6.

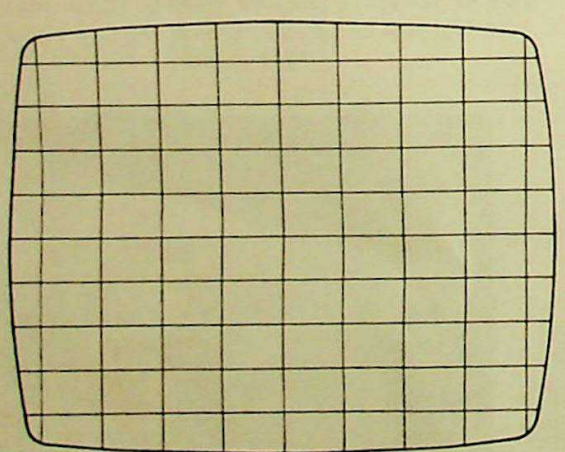


Figure 6. Crosshatch pattern showing fixed number of horizontal and vertical lines. There are 11 horizontal and 12 vertical lines generated. Of these, approximately 9 horizontal and vertical lines will be seen with normal overscan adjustment.

Horizontal and Vertical Linearity Adjustment

1. Set the PATTERN switch to "CROSSHATCH" and the FUNCTION switch to "PATTERN". Adjust receiver fine-tuning control if necessary.
2. The crosshatch pattern permits accurate checks of the horizontal and vertical linearity in both black-and-white and color receivers. Adjust the horizontal adjustment controls of the receiver so that the vertical bars of the crosshatch pattern are equally spaced. Adjust the vertical controls so that the horizontal bars of the crosshatch pattern are equally spaced.

Purity Adjustment

Color purity adjustments can be made using the blank raster function of the WR-508A. The purpose of purity adjustment is to obtain a high-quality or "pure" red, blue, and green field. The red field for example, should be a uniform red, with no contamination from blue or green light. When all three primary color fields are properly adjusted, a pure, uniform white raster will be obtained.

Convergence Adjustment

Misconvergence of a color receiver can be noted by observing the crosshatch or dot pattern on the screen. If the set is properly converged, the lines or dots will be clear and sharp, with no color fringing. There are two basic steps in the convergence procedure—static convergence and dynamic convergence. In static convergence, the permanent magnets on the neck of the picture tube are adjusted to obtain convergence of the red, blue and green beams at the center of the screen only. In the dynamic convergence procedure, the current waveforms passing through the convergence electromagnets are adjusted for proper convergence at the edge areas of the receiver screen.
The receiver manufacturer's recommended procedure for convergence adjustment must be followed. The dot, or the crosshatch patterns can be used in the convergence procedure. Many technicians prefer to use the dot pattern for static convergence, and the crosshatch pattern for the various adjustments in the vertical dynamic and horizontal dynamic convergence procedure.
Before adjusting convergence, it is necessary to check other adjustments, especially purity, as specified in the service data for the receiver. These adjustments include horizontal tuning, horizontal drive, high-voltage regulation, height, width, linearity, focusing, etc.

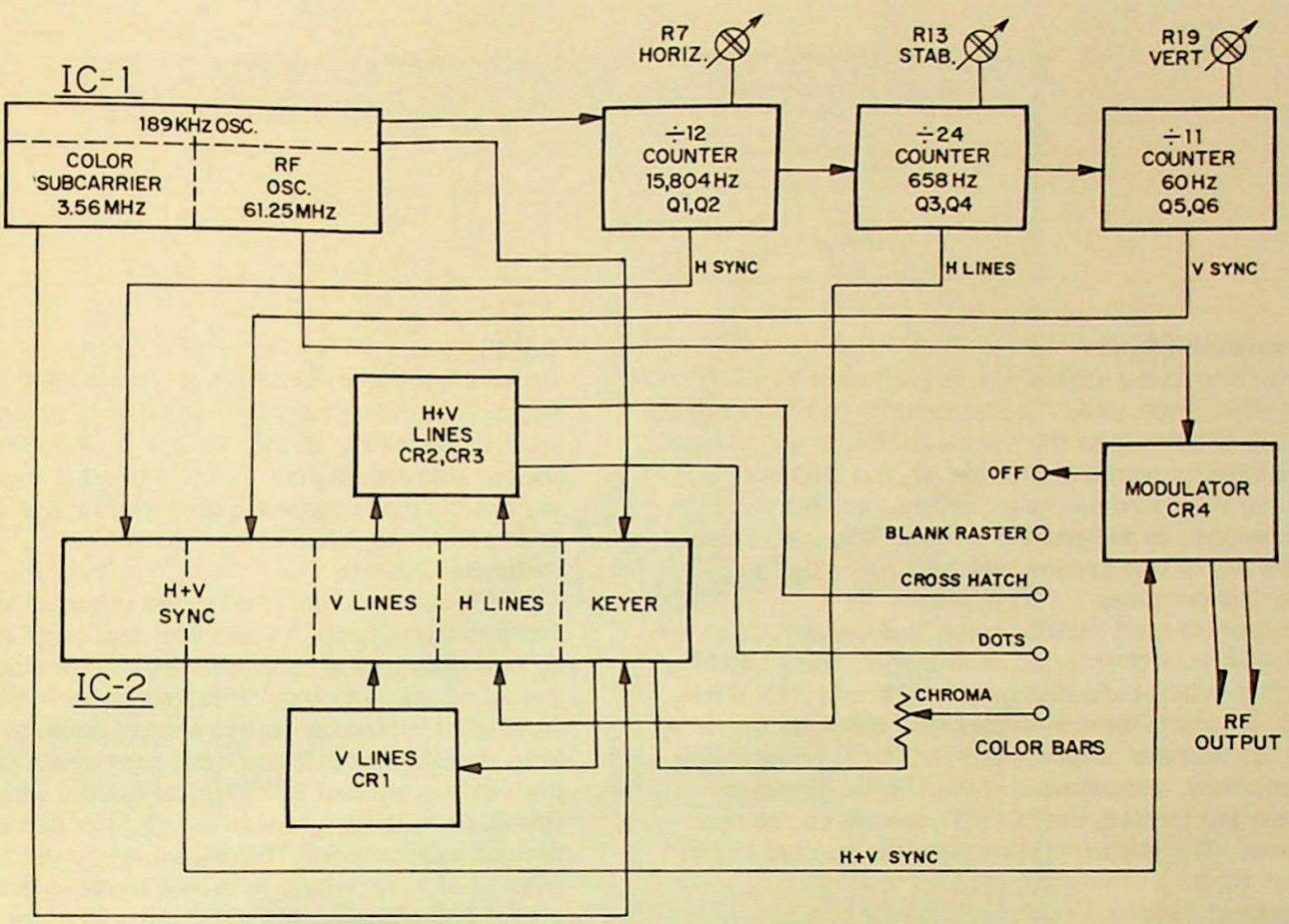


Figure 7. WR-508A block diagram.

Circuit Description

The WR-508A is a compact, solid-state generator, providing signals to produce color bars, dots, crosshatch and blank raster. A total of six transistors, two multiple-section integrated circuits, and six diodes are used.

The WR-508A is powered by a single 4.5 volt alkaline battery, RCA type VS1149 or equivalent. For convenience in testing and replacement, the battery compartment slides out the rear panel. An accessory AC Adapter, the WG-425A, is available separately for operating the generator from a standard 120 volt, 60 Hz power line.

A 264 single-line scan system is used rather than the 525-line interlace system. The 264 line raster provides small dots and single horizontal line registration with no flicker.

The following signals are developed in the generator:

Repetition Rate of Pulse	*Function*
15804 Hz	H sync
60 Hz	V sync
61.25 MHz	picture carrier (channel 3)
3563.741 kHz	color off-set frequency
189.6 kHz	vertical lines
658 Hz	horizontal lines

All vertical and horizontal lines, sync signals, and color bar gating signals are derived from the 189.6 kHz oscillator. This oscillator consists of crystal Y1, and two sections of 1C-1 (pins 9, 11, 12, 1).

This signal is fed to the three astable multivibrator counter circuits formed by Q1/Q2, Q3/Q4, and Q5/Q6 where the sync and V and H line frequencies are developed.

Horizontal Sync

The horizontal sync signal is produced by the Q1/Q2 multivibrator, which counts down by a factor of 12 from 189.6 kHz to the horizontal sync frequency of 15,804 Hz. Variable resistor R7, the "HORIZ" control located on the rear panel, adjusts the frequency of the counter circuit. The sync pulse is applied to one section of 1C-2.

Horizontal Lines

Output from Q1 (15,804 Hz) is fed through C6 to the Q3/Q4 multivibrator counter stage. The 15,804 Hz signal is differentiated by C6, R31, and R15. The Q3/Q4 multivibrator divides the 15,804 Hz signal by 24, so that the output is 658 Hz, the horizontal line frequency. Adjustment of the Q3/Q4 circuit is provided by R13, the "STAB" control on the rear panel. The horizontal line signal is applied to pin 9 of 1C-2.

Vertical Sync

Vertical sync signals are obtained from the Q5/Q6 multivibrator circuit, which divides the 658 Hz signal by 11, providing output at 60 Hz. Adjustment of this counter is provided by R19, the "VERT" control on the rear panel. This 60 Hz vertical sync signal is applied through R38 to pin 4 of 1C-2. Vertical sync output is provided at pin 5 of 1C-2, where it is combined with the H sync signal at pin 1.

V Lines

Vertical lines are produced by processing the 189.6 kHz signal. This signal is obtained from pin 12 of 1C-1, then applied to pin 12 of 1C-2, where it is amplified. Differentiating and clipping action is provided by components C20, R28, R29, and CR1. The signal is then applied to another section of 1C-2 (pin 6) where it is further amplified, providing output at pin 8. Since 189 kHz is 12 times the horizontal rate, 12 vertical lines are formed. Only 9 or 10 of the bars will be seen, the rest being lost during the horizontal sync period.

Crosshatch Patterns

The horizontal and vertical line signals are passed through CR2 and CR3, where they are combined to form the crosshatch pattern. The combined signal is then connected to S1, with the sync signals, to form the composite video signal.

Dot Pattern

When the function switch is set to the DOT position, horizontal and vertical line signals are selected from the output to diodes CR2 and CR3. The switch also shorts pins 8 and 11 of 1C-2 together, so that the signal appears only when the V and H lines intersect.

Color Bar Pattern

The WR-508A produces a "gated rainbow" color bar pattern. Crystal Y1 and one section of IC-1 (pins 6, 7, and 8) from an oscillator circuit providing a signal of 3563.741 kHz. This frequency is off-set from the standard color subcarrier signal by 15,804 kHz, the horizontal frame frequency. As a result, a phase difference of 360 degrees occurs with each frame, producing a "rainbow" of color across the picture tube screen. This signal is applied to one section of 1C-2, which acts as a keyer to gate the signal at a 189 kHz rate, producing 12 color bars at 30 degree phase intervals. Two of the bars are eliminated during the sync interval.

The color bar signal output is fed through the CHROMA LEVEL control, R26.

Blank Raster

In the blank raster function, the function switch disables the vertical and horizontal signals so that only sync modulation is present.

RF Carrier and Modulator

The 61.25 MHz channel 3 picture carrier oscillator is composed of crystal Y3 and a section of 1C-1 (pins 3, 4, and 5).

The picture carrier and all pattern signals are connected to the CR4 modulator circuit. The modulated signal is then connected to the RF output lead.

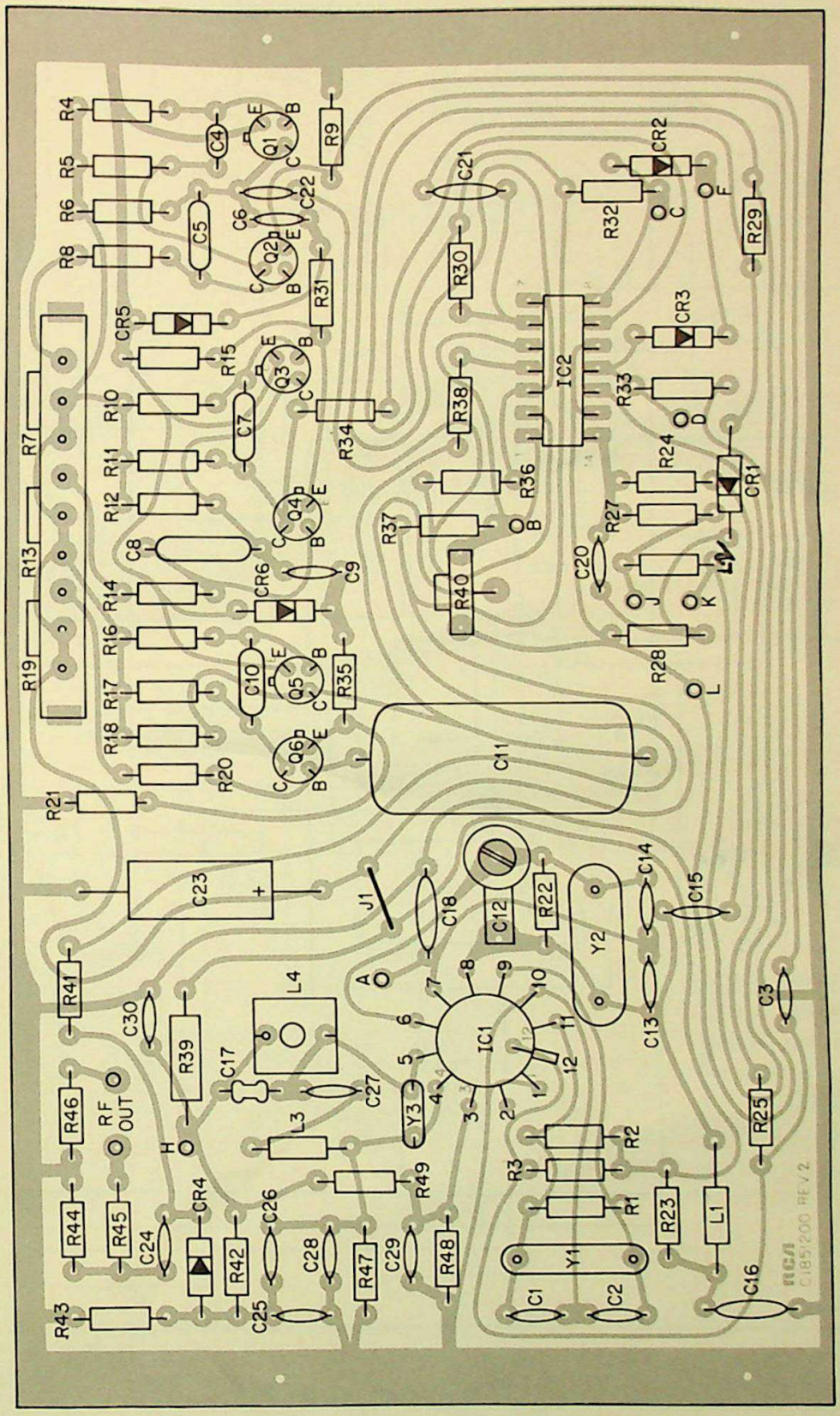
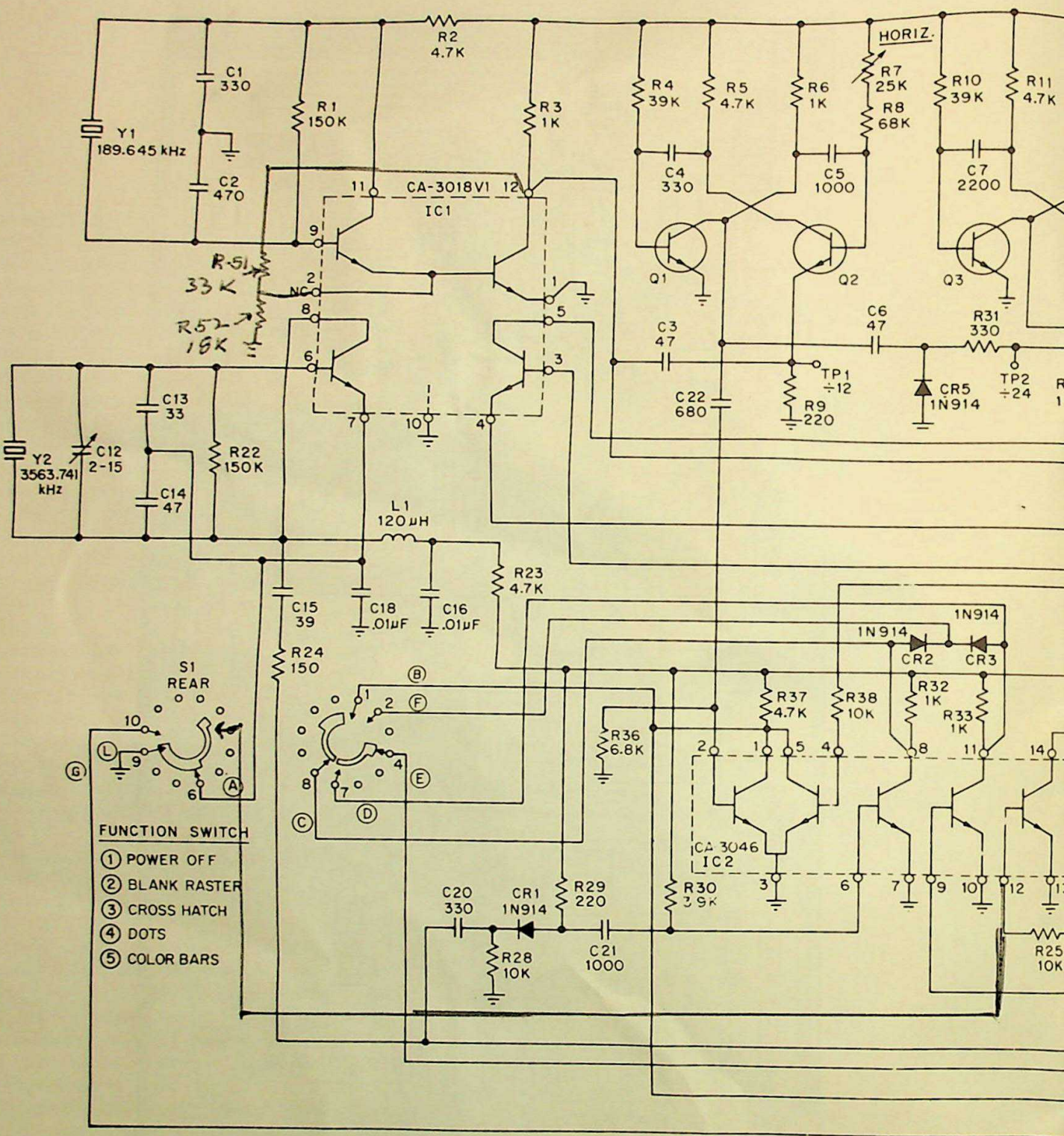
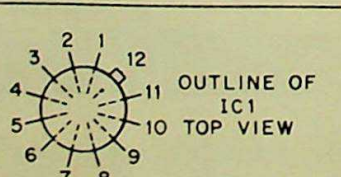
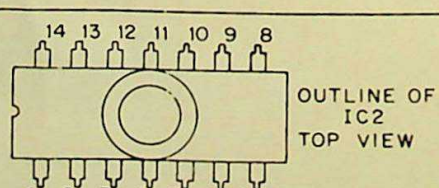
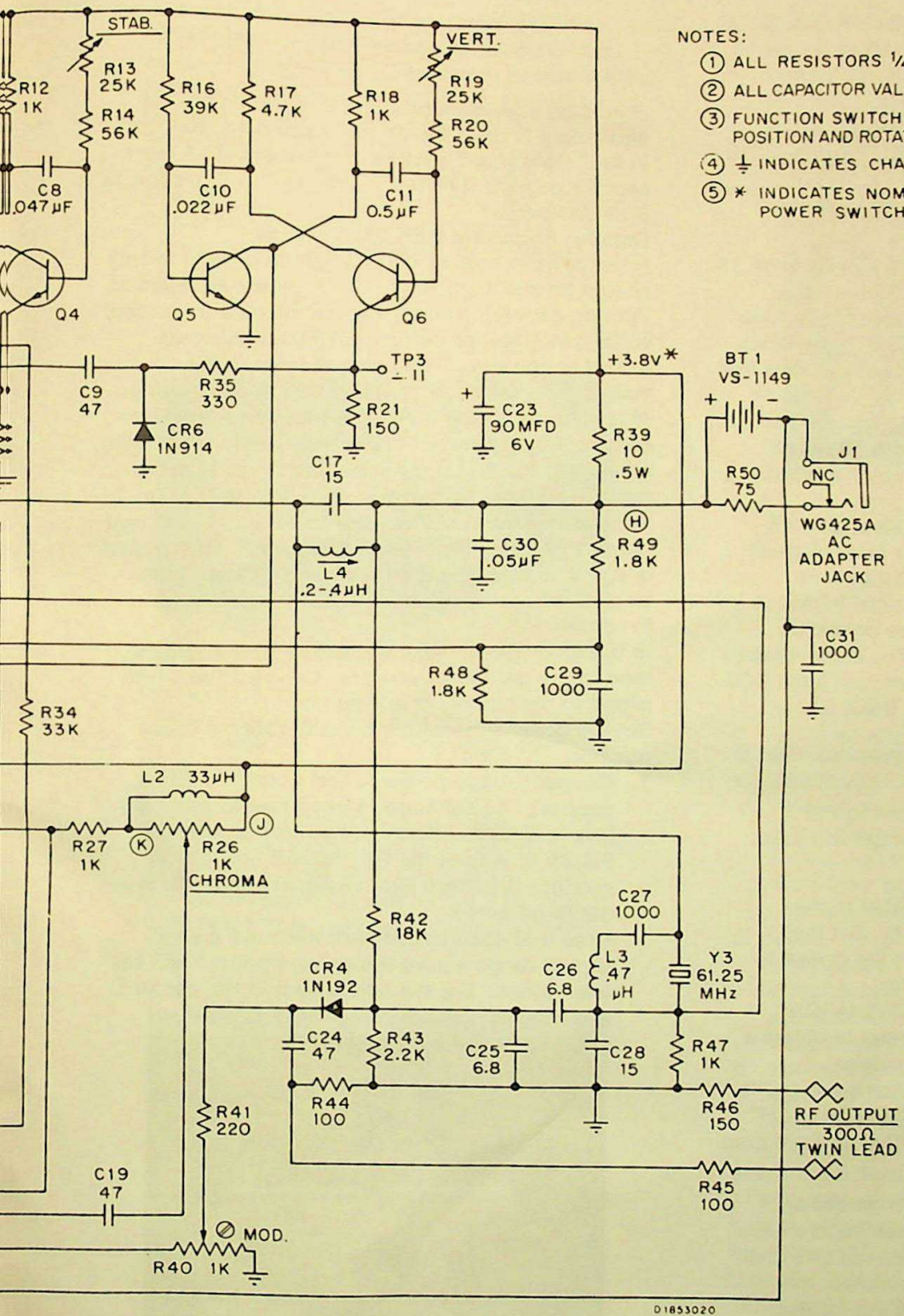


Figure 8. Component location, viewed from foil side of circuit board.


R2 4.7K
C1 330
R1 150K
R3 1K
Y1 189.645 kHz
C2 470
CA-3018V1
IC1
R-51 33K
R52 15K
HORIZ.
R4 39K
R5 4.7K
R6 1K
R7 25K
R8 68K
R10 39K
R11 4.7K
C4 330
C5 1000
C7 2200
Q1
Q2
Q3
C3 47
C6 47
R31 330
TP1 ÷12
TP2 ÷24
C22 680
R9 220
CR5 1N914
C13 33
Y2 3563.741 kHz
C12 2-15
C14 47
R22 150K
L1 120µH
R23 4.7K
C15 39
C18 .01µF
C16 .01µF
1N914
CR2
CR3
R24 150
S1 REAR
R37 4.7K
R38 10K
R32 1K
R33 1K
R36 6.8K
CA 3046
IC2
C20 330
CR1 1N914
R29 220
R30 3.9K
R28 10K
C21 1000
R25 10K
FUNCTION SWITCH
1 POWER OFF
2 BLANK RASTER
3 CROSS HATCH
4 DOTS
5 COLOR BARS


OUTLINE OF IC1 TOP VIEW


OUTLINE OF IC2 TOP VIEW



WR-508A schematic diagram.

Maintenance

General

The performance of the RCA CHRO-BAR Generator depends on the quality of the components. If it becomes necessary to replace any of the component parts, only RCA replacement parts or their equivalents should be used. When ordering replacement parts, refer to the Parts List on page 18. The schematic diagram for the instrument is on pages 12 and 13. Further aids to servicing include the Circuit Description, page 9, Figure 7, the Block Diagram, Figures 13 through 22 showing various test waveforms, and Figure 8, showing the location of components on the circuit board. The generator can be removed from the case by taking out the two screws on each side and four screws on the bottom.

Operation on Channel 4

The unit is provided with a 61.25 MHz channel 3 crystal. In some areas however, the local channel station signal may be so strong that it causes interference with the generator pattern. In this situation, it is recommended that the crystal be replaced with a channel 4 crystal. The stock number for the crystal is 243333. Order from your local RCA Parts and Accessories Distributor. It will be necessary to readjust the RF oscillator as indicated below.

RF Oscillator Adjustment

The picture-carrier oscillator should require adjustment only if the crystal or component parts are changed.

1. Connect the WR-508A output cable to the antenna terminals of the receiver. Set the receiver to the same channel as the crystal in the RF oscillator of the generator.
2. Set the function switch to "CROSSHATCH". Adjust coil L4 slightly as necessary to obtain a crosshatch pattern on the TV receiver.
3. Turn the generator function switch back and forth several times from "OFF" to "CROSSHATCH". The crosshatch pattern should lock in each time.

Counter Alignment Procedure

The WR-508A circuit includes three divider or counter multivibrator stages. If these counters are out of alignment, an improper pattern or an out of sync pattern will result. For convenience, the controls that adjust these counters are located on the rear panel, and are marked "HORIZ", "STAB", and "VERT".

Although these controls are pre-set at the factory, they can easily be re-set, if necessary. The simplified alignment procedure requiring no test equipment is provided on the instrument label and in the "Operation" section of this manual. A more precise alignment method, using an oscilloscope, is provided below:

Counter Alignment with Oscilloscope

Note: A fresh battery (RCA VS-1149 or equivalent) should be installed before the counters are aligned. Turn on generator and allow ten minutes for battery voltage to stabilize before making adjustments. Adjust scope sweep rate as indicated in the instructions for each counter, before proceeding with alignment. Set sweep vernier for at least two complete waveforms. For correct counter alignment, all waveforms on each trace must have the same number of pips. With incorrect adjustment, it is possible for adjacent waveforms to have a different number of pips. Re-set sweep vernier to obtain just one or two waveforms to adequately expand the trace.

Procedure:

In the following steps, connect the scope ground lead to the generator chassis. Connect the direct probe to the specified test point.

Set the generator switch to the CROSSHATCH position.

1. Connect scope probe to test point TP1 (Q2 emitter). Adjust scope sweep rate to about 80 kHz to obtain a stationary pattern similar to Figure 9. Adjust the R7 "HORIZ" control to produce a pattern with 12 equal spaces between the large pulses.
   Note that each adjustment will have a small usable range where the correct pattern will be maintained. Set the adjustment in the center of this range.

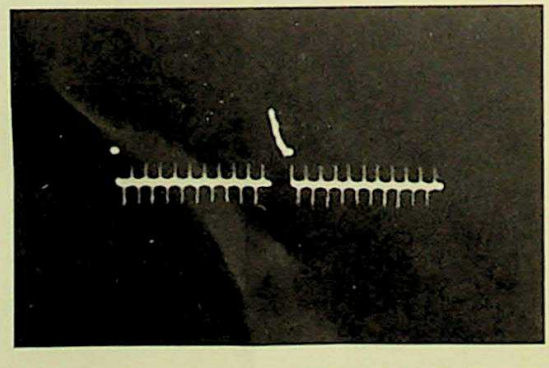


Figure 9. TP-1, Q2 emitter. 189 kHz ÷ 12 (15,804 Hz). Sweep rate 80 kHz. 0.7 V P-P. Adjust R7 "HORIZ" control for 12 equal spaces between large pulses.

2. Connect the scope probe to test point TP2 (Q4 emitter). Adjust the scope sweep rate to about 7 kHz to obtain a stationary pattern similar to Figure 10. Adjust R13 "STAB" control to produce a pattern with 24 equal spaces between large pulses. To see the "pips", it may be necessary to increase the scope vertical gain, viewing only the base line area of the waveform. It may also be necessary to expand the trace horizontally with the scope horizontal gain control.

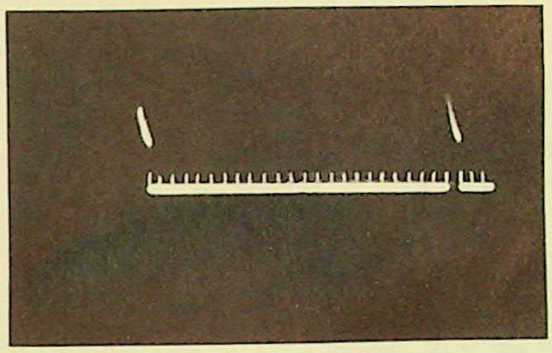


Figure 10. TP-2, Q4 emitter. 15,804 Hz ÷ 24 (658 Hz). Sweep rate, 7 kHz. 0.5V P-P. Adjust R13 "STAB" control for 24 equal spaces between large pulses.

3. Connect the scope probe to test point TP3 (Q6 emitter). Adjust the scope sweep rate to about 1 kHz to obtain a stationary pattern similar to Figure 11. Adjust the R19 "VERT" control for 11 equal spaces between large pulses.

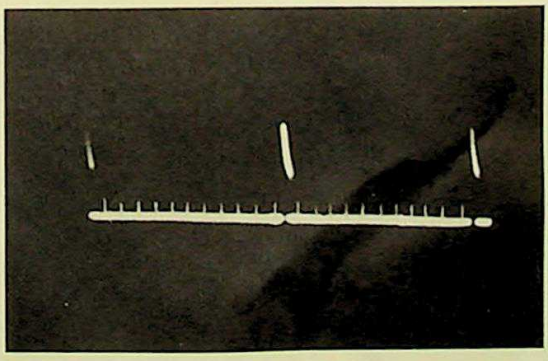


Figure 11. TP-3, Q6 emitter. 658 Hz ÷ 11 (60 Hz). Sweep rate 1 kHz. 0.5V P-P. Adjust R19, "VERT" control for 11 equal spaces between large pulses.

4. Check the above adjustment by setting the scope sweep to 60 Hz line frequency. The pattern should resemble Figure 12. It is normal for the pattern to have a slow, horizontal drift, returning to its original position about every three seconds.
5. Alternately repeat steps 1 through 4 as necessary to lock in a stable crosshatch pattern.

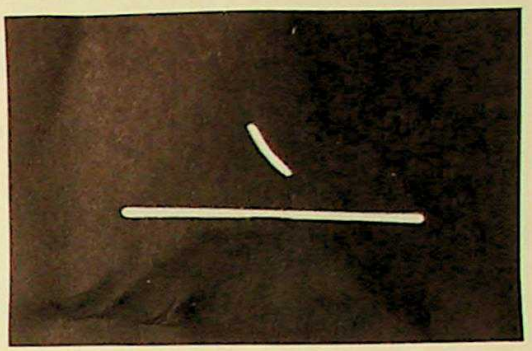


Figure 12. TP3. Q6 emitter. 658 Hz ÷ 11 (60 Hz). Sweep set to 60 Hz line frequency. 0.5V P-P.

Modulation Level Adjustment

1. Connect the instrument to a TV receiver. Set the function switch to the DOTS position and obtain a crosshatch pattern on the receiver screen. Adjust the receiver brightness control so that there is no background brightness and only the dots are visible.
2. Using a small screwdriver, adjust the modulation level control, R40 (located near the center of the circuit board, near the large capacitor, C11) fully counterclockwise so that the background area of the pattern turns black.
3. Turn the control clockwise to the point where the dots "wash out" and cannot be seen, then counterclockwise just to the point where the dots appear.

Sub-Carrier Frequency Adjustment

The frequency of the sub-carrier oscillator must be held to very close tolerances. This frequency has to be within ±10 cycles of 3563.741 kHz. It is for this reason that a special crystal is used in the generator, and it is also for this reason that exact replacement parts must be used in its repair. Checking or readjusting the frequency of the 3563.741 kHz oscillator would normally involve the use of laboratory-type equipment. Fortunately

however, it is possible to use the color sync burst signals on network color programs as a standard of reference. This procedure is described below:

1. Connect an antenna to the receiver and tune for a network color program. Make all adjustments necessary to produce a normal color picture.
2. Remove the color-sync burst signals, or DC correction voltage, used in the chroma circuit of the receiver to lock the 3.58 MHz oscillator on frequency. Information on this procedure is contained in the manufacturer's service data for the particular receiver.
3. Adjust the 3.58 MHz oscillator in the receiver for zero beat.
4. Disconnect the antenna leads from the receiver terminals. With the correcting circuit still disabled, connect the output cable of the WR-508A to the antenna terminals of the receiver.
5. Set the generator switch to the "COLOR BAR" position, the CHROMA LEVEL control to mid-range. Adjust the receiver fine-tuning to obtain a normal color bar pattern.
6. Adjust C12 so that a zero beat condition is obtained in the color bar pattern.
7. Because of the low tolerances permissible in the sub-carrier frequency adjustment, it is advisable to repeat steps 1 through 6.

Circuit Waveforms

The oscilloscope patterns shown are provided as an aid in troubleshooting the WR-508A. Set the Pattern Switch to the designated pattern. Set chroma level control to midrange. Use a wideband oscilloscope such as the RCA WO-505A. Sweep and voltage references are approximate. Use a direct probe.

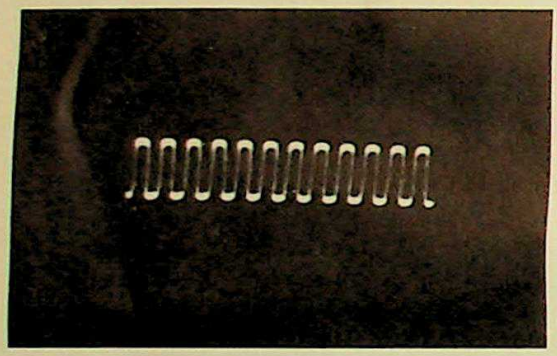


Figure 13. 189 kHz oscillator IC-1, pin 12. H & V function 15 kHz sweep rate. 3V P-P.

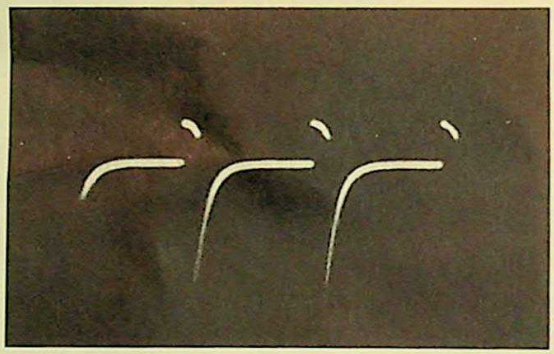


Figure 14. H sync development IC-2, pin 2. H & V function 5 kHz sweep rate. 2.8V P-P.

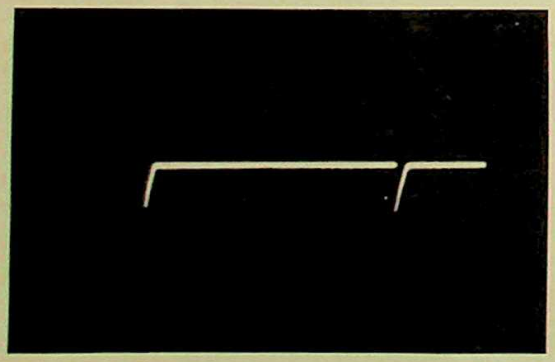


Figure 15. Q3 base. H & V function. Typical multivibrator waveform. 400 sweep rate. 2.5V P-P.

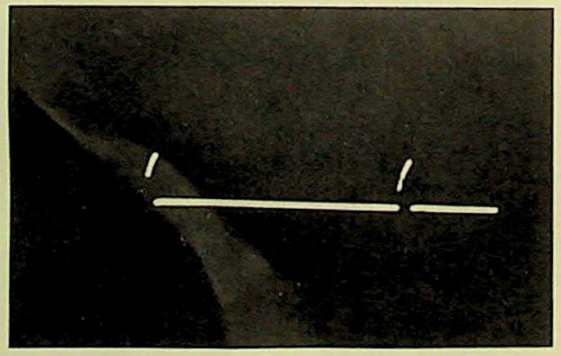


Figure 16. Q3 collector. H & V function. Typical multivibrator waveform. 400 sweep rate. 2.5V P-P.

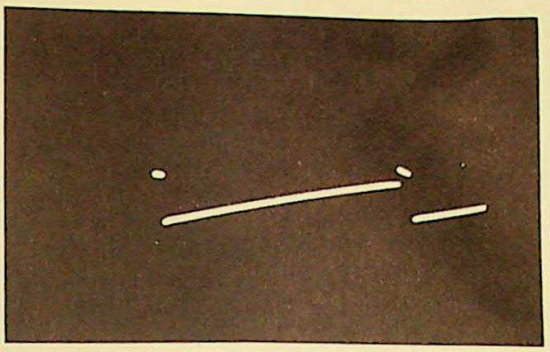


Figure 17. Q4 base. H & V function. Typical multivibrator waveform. 400 sweep rate. 2.5V P-P.

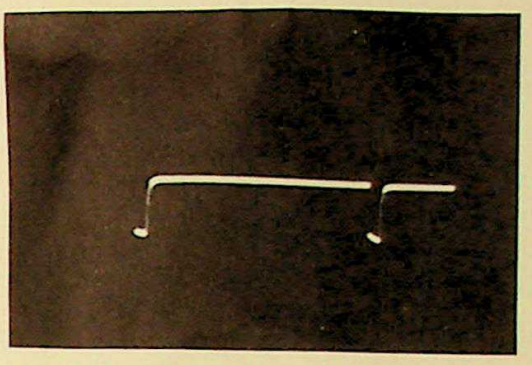


Figure 18. Q4 collector. H & V function. Typical multivibrator waveform. 400 sweep rate. 3V P-P.

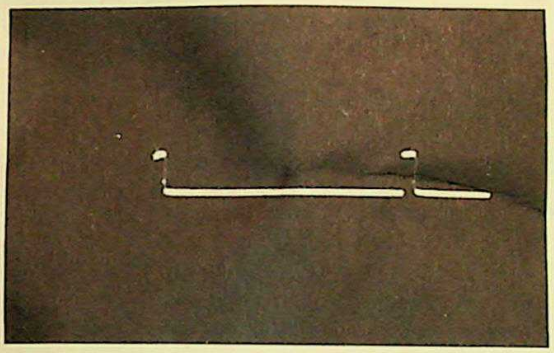


Figure 19. H & V function. IC-2, pin 11. H line development. 658 Hz. Pulse is 63 μS wide. Sweep rate 400. 2.5V P-P.

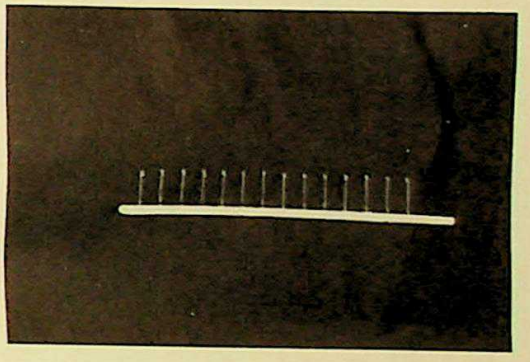


Figure 20. H & V function. IC-2, pin 8. V line development. 189 kHz. Sweep rate 12 kHz. 2.0V P-P.

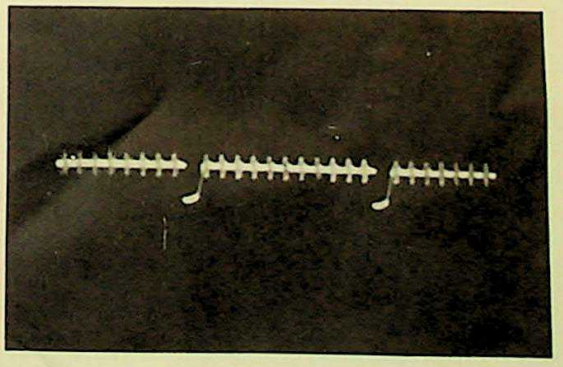


Figure 21. Color Bar function composite signal. Junction of R27, L2, and R26. Sweep rate 7 kHz.

Replacement Parts List
WR-508A MINI CHRO-BAR Generator

When ordering replacement parts, include serial number and code number of instrument. Order parts by stock number, through a local RCA Distributor.

Symbol No.	Description	Stock No.
	RESISTORS	
	All resistors are fixed composition, ¼ watt, unless noted otherwise.	
R1	150k, ±10%	223770
R2	4.7k, ±10%	300739
R3	1k, ±10%	108865
R4	39k, ±5%	218550
R5	4.7k, ±5%	300739
R6	1k, ±10%	108865
R7, R13, R19	Variable, three section, 25k, ±10%	419646
R8	68k, ±5%	288447
R9	220 ohms, ±10%	232688
R10	39k, ±5%	218550
R11	4.7k, ±10%	300739
R12	1k, ±10%	108865
R13	Part of R7	
R14	56k, ±5%	300649
R15	150 ohms, ±10%	227744
R16	39k, ±5%	218550
R17	4.7k, ±10%	300739
R18	1k, ±10%	108865
R19	Part of R7	
R20	56k, ±5%	300649
R21	150 ohms, ±10%	227744
R22	150k, ±10%	223770
R23	4.7k, ±10%	305739
R24	150 ohms, ±10%	227744
R25	10k, ±10%	218499
R26	Variable, 1k, ±20%	419647
R27	1k, ±10%	108865
R28	10k, ±10%	218499
R29	220 ohms, ±10%	232688
R30	3.9k, ±5%	285405
R31	330 ohms, ±5%	219458
R32, R33	1k, ±10%	108865
R34	33k, ±10%	285404
R35	330 ohms, ±5%	219458
R36	6.8k, ±10%	108867
R37	1k, ±10%	108865
R38	10k, ±10%	218499
R39	10 ohms, ½ watt, ±10%	285573
R40	Variable, 1k, ±30%	244832
R41	220 ohms, ±10%	232688
R42	18k, ±10%	108870
R43	2.2k, ±10%	108866
R44, R45	100 ohms, ±10%	108861
R46	150 ohms, ±10%	227744
R47	1k, ±10%	108865
R48, R49	1.8k, ±10%	219460
R50	75 ohms, ½ watt, ±5%	502075

Symbol No.	Description	Stock No.
	CAPACITORS	
C1	Ceramic disc, 330 pF, ±5%	109295
C2	Ceramic disc, 470 pF, ±5%	109383
C3	Ceramic disc, 47 pF, ±10%	243311
C4	Mica, 330 pF, ±5%	79191
C5	Mica, 1000 pF, ±5%	300196
C6	Ceramic disc, 47 pF, ±10%	243311
C7	Mica, 2200 pF, ±5%	921779
C8	Mylar, .047 MF, ±10%, 100V	266436
C9	Ceramic disc, 47 pF, ±10%	243311
C10	Mylar, .022 MF, ±10%, 100V	225188
C11	Mylar, 0.5 MF, 200V	419642
C12	Variable, ceramic, 2-15 pF	419645
C13	Ceramic disc, 0.33 pF, ±10%	261549
C14	Ceramic disc, 47 pF, ±10%	243311
C15	Ceramic disc, 39 pF, ±10%	419639
C16	Ceramic disc, .01 MF, GMV	267478
C17	Ceramic disc, 15 pF, NPO, ±5%	45465
C18	Ceramic disc, .01 MF, GMV	267478
C19	Ceramic disc, 47 pF, ±10%	243311
C20	Ceramic disc, 330 pF, ±5%	109245
C21	Ceramic disc, 1000 pF, ±10%	240846
C22	Ceramic disc, 680 pF, ±10%	113165
C23	Electrolytic, 90 MF, +80% −20%, 6V	241709
C24	Ceramic disc, 47 pF, ±10%	243311
C25, C26	Ceramic disc, 6.8 pF, ±10%	419640
C27	Ceramic disc, 1000 pF, ±10%	240846
C28	Ceramic disc, 15 pF, ±10%	419641
C29	Ceramic disc, 1000 pF, ±10%	240846
C30	Ceramic disc, .05 MF, +80% −20%, 10V	300725
C31	Ceramic disc, 1000 pF, ±10%	240846
	MISCELLANEOUS	
Y1	Crystal, 189.645 kHz	243330
Y2	Crystal, 3563.741 kHz	243329
Y3	Crystal, 61.25 MHz (channel 3)	243332
Y3A	Crystal, 67.25 MHz (channel 4)	243333
L1	Coil, 120 μH	243392
L2	Coil, 33 μH	243393
L3	Coil, .47 μH	243395
L4	Coil, variable, 0.2 μH to 0.4 μH	243396
CR1, CR2, CR3, CR5, CR6	Diode, silicon, 1N914	229936
CR4	Diode, germanium, 1N192	228050

R51 33K 285404
R52 18K 108870[18]

Symbol No.	Description	Stock No.
Q1, Q3, Q5	Transistor, silicon	248490
Q2, Q4, Q6	Transistor, silicon	248491
IC-1	Integrated circuit, RCA CA-3018V1	419643
IC-2	Integrated circuit, RCA CA-3046	419644
S1	Switch, rotary, function	419652
	Panel, aluminum, with markings	419648
	Printed Circuit Board	419651
	Cover, case	244574
	Knob, for function switch	419649
	Knob, for chroma control	419650
	Battery Holder Bracket	419653
	Jack, subminiature, for AC Adapter	111454
	Alligator clip	35262
	Insulator, for alligator clip	99539
	Cable, RF Output	WG-406A

RCA

NOTES:

1. ALL RESISTORS 1/4W UNLESS NOTED
2. ALL CAPACITOR VALUES IN pF UNLESS NOTED
3. FUNCTION SWITCH SHOWN IN "OFF" POSITION AND ROTATES CLOCKWISE
4. ⏚ INDICATES CHASSIS GROUND
5. * INDICATES NOMINAL VOLTAGE WITH POWER SWITCH "ON"

FUNCTION SWITCH

1. POWER OFF
2. BLANK RASTER
3. CROSS HATCH
4. DOTS
5. COLOR BARS

OUTLINE OF IC1 TOP VIEW

OUTLINE OF IC2 TOP VIEW

D1853020

WR-508A schematic diagram.

Addenda
to
WR-508A Instruction Manual

Battery Installation

The 4.5 volt battery supplied with the WR-508A is not installed in the unit but is packed separately in the envelope with the instruction manual. To install the battery, simply loosen the two feet under the battery compartment, then slide the compartment out the back. See pages 4 and 5 of the manual for further information.

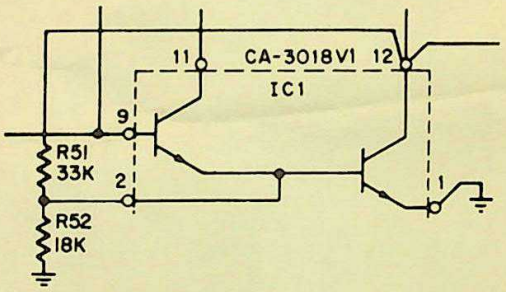
REVISIONS

Page 11, Figure 8

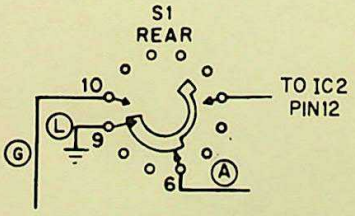
In the illustration, the component located between R27 and R28 marked "L-1," should instead be marked *"L-2."*

Pages 12 and 13, Schematic Diagram

Add R51 and R52 to pins 2 and 12 of IC-1 as noted below:



Add connection from S1 to IC-2, pin 12, as noted below:



Page 18, Parts List

Add the following items:

R51, 33K, ±10%, Stock No. 285404

R52, 18K, ±10%, Stock No. 108870

RCA

Electronic Instrument Service Order

Authorized RCA Electronic Equipment Service Depots throughout the United States are available for repair and calibration of RCA factory-wired test equipment. For up-to-date listings of these Authorized Depots contact your RCA Distributor or write to RCA, Electronic Instruments, 415 South 5th Street, Harrison, New Jersey 07029.

DO NOT SEND EQUIPMENT TO RCA

When returning an instrument to the Service Depot for repair, fill in this form as completely as possible, and enclose it with the instrument.

Owner's Name_____

Street and No._____

City and Sate_____

Instrument Type No. _____ Serial No._____

(Sales slip or proof of purchase must be supplied if warranty is claimed.) See reverse side for terms of warranty.

Purchased from_____

Street and No._____

City and State_____

Date of Purchase_____ Sales Slip No._____

Was Warranty Registration card mailed to RCA at time of purchase?_____

If instrument is out of warranty, request Service Depot . . . (indicate your choice below):

☐ *Repair and return* ☐ *Quote cost before repairing*

Description of trouble. (Be specific. Use reverse side of form if more space is needed. State what repairs you wish made.)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

IMPORTANT!

Damage incurred in shipment will be the owner's responsibility if the instrument is not properly packed. Observe the following precautions:

1. Carefully pack instrument in an oversize extra-heavy corrugated carton. Float the instrument in at least 3 inches of excelsior or wadded paper.
2. Enclose all test leads and probes with instrument. Individually wrap each of these accessories.
3. Ship instrument by Parcel Post or Railway Express prepaid. Insure shipment for its full replacement value.

RCA | Electronic Components | Harrison, N. J. 07029

EI 120 (4) 1/70

(SEE OTHER SIDE)

WARRANTY

All factory-wired instruments, except for batteries which may be contained therein, are warranted by RCA against defects in workmanship, materials and construction, and under normal operating conditions should give satisfactory service.

RCA will repair or, at its option, replace any defective factory-wired instrument or accessory provided it is returned no later than one year after date of sale to the original user and RCA's inspection discloses that the defect was warranted hereunder. Claimants must return defective product transportation prepaid, along with a service report, to an Authorized RCA Test Equipment Service Depot (lists of such depots are available from distributors or directly from RCA). The repaired or replacement product will be shipped prepaid to the claimant without charge by RCA and will carry forward the original warranty for the balance of the one-year period. All adjustments for factory-wired instruments purchased by users are contingent upon warranty registration of the instrument with RCA at the time of purchase.

RCA is not responsible for labor other than for the RCA repairs specifically provided above, and RCA is not responsible for products which have been subjected to misuse, alteration (including the removal, defacing or alteration of identification numbers), accident, non-RCA repairs, or for products which are lost or damaged in transit.

The foregoing warranty constitutes RCA's sole liability hereunder and is in lieu of any other warranty expressed, implied, or statutory.

Description of Trouble (Continued)

RCA WR-508A
MINI CHRO-BAR GENERATOR

R.C.A.

Dot - Bar Generator